

ALLIED HEALTH SCIENCES

Revised Ordinance Governing

B.Sc. MEDICAL LABORATORY TECHNOLOGY DEGREE COURSE AND CURRICULUM



RAJIV GANDHI UNIVERSITY OF
HEALTH SCIENCES, KARNATAKA



Rajiv Gandhi University of Health Sciences,
Karnataka, Bangalore

The Emblem



The Emblem of the Rajiv Gandhi University of Health Sciences is a symbolic expression of the confluence of both Eastern and Western Health Sciences. A central wand with entwined snakes symbolises Greek and Roman Gods of Health called Hermis and Mercury is adapted as symbol of modern medical science. The pot above depicts Amrutha Kalasham of Dhanvanthri the father of all Health Sciences. The wings above it depicts Human Soul called Hamsa (Swan) in Indian philosophy. The rising Sun at the top symbolises knowledge and enlightenment. The two twigs of leaves in western philosophy symbolises Olive branches, which is an expression of Peace, Love and Harmony. In Hindu Philosophy it depicts the Vanaspathi (also called as Oushadi) held in the hand of Dhanvanthri, the source of all Medicines. The human energy (kurma) "Yadayahu" inside the Shanthi Mantra (Shrunuyanadev...), the span of our lives allotted to us is the motto of the Health Sciences.

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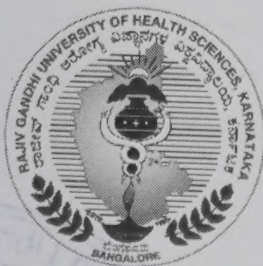
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Revised Ordinance Governing Regulation & Curriculum for
Bachelor of Science Degree Courses in Allied Health Science
B.Sc. MEDICAL LABORATORY TECHNOLOGY



RAJIV GANDHI UNIVERSITY OF
HEALTH SCIENCES KARNATAKA

4th 'T' Block, Jayanagar, Bangalore 560041

Revised Ordinance Governing
Regulation & Curriculum for
Bachelor of Science Degree
Course in Allied Health Science for First Year
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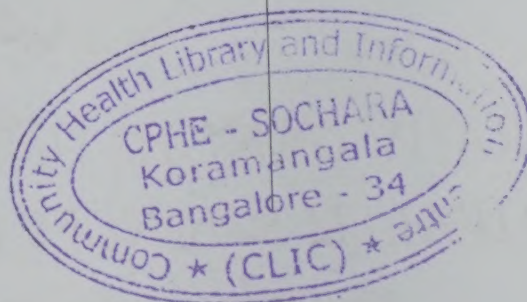
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Rajiv Gandhi University of Health Sciences, Karnataka
ರಾಜೀವ್ ಗಾಂಧಿ ಆರೋಗ್ಯ ವಿಜ್ಞಾನಗಳ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕರ್ನಾಟಕ

Ref.: UA/AUTH/1 YEAR A.H.S/126/2007/08

Date : 29-06-2007

NOTIFICATION

Sub: Revised Ordinance Governing Regulations and common curriculum for first year Bachelor of Science Degree courses in Allied Health Sciences.

- Ref. 1. Proceeding of Academic Council Meeting dated 06/05/2007.
2. Minutes of the Syndicate meeting held on 16/05/2007.

In exercise of the powers conferred under section 35(1) of the RGUHS Act 1994, the Syndicate in its meeting held on 16/05/2007 decided to implement the Revised Ordinance Governing Regulation and common curriculum for first year Bachelor Science Degree Courses in Allied Health Sciences as shown in Annexure herewith.

The above Ordinance comes into effect from the academic year 2007-08 and onwards.

By order,

sd/-

REGISTRAR

To

The Principals of Allied Health Science Colleges affiliated to RGUHS.

Copy to :

1. The Secretary to his excellency the Governor of Karnataka, Raj Bhavan, Bangalore - 560001
2. Secretary to Government, Health & Family Welfare Department, (Medical Education), Vikasa Soudha, Bangalore - 560001.
3. PA to Vice - Chancellor / PA to Registrar (Eva.) / PA to Finance Officer.
4. Home page of RGUHS Website.
5. All Officers of the RGUHS
6. Guard File / Office Copy.



Rajiv Gandhi University of Health Sciences, Karnataka
ರಾಜೀವ್ ಗಾಂಧಿ ಆರೋಗ್ಯ ವಿಜ್ಞಾನಗಳ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕರ್ನಾಟಕ

Ref.: AUTH/BOS-AS/344/2008/09

Date : 04-08-2008

NOTIFICATION

Sub : Revised Ordinance Governing Regulations and Course contents for 2nd & 3rd year Bachelor Courses in Allied Health Science, Subjects.

- Ref. 1. Minutes of meeting of Syndicate held on 30/07/2008.
2. Recommendations of BOS Allied Health Sciences dated 19/07/2008.

In exercise of the powers conferred under section 35(2) of the RGUHS Act 1994, the Syndicate in its meeting held on 30/07/2008 is notify the Revised Ordinance Governing Regulation and Course contents for 2nd & 3rd year Bachelor Courses in Allied Health Science Subjects as shown in the annexure appended herewith. The above Ordinance shall come into force with effect from the academic year 2008-09 and onwards.

It is also notified that students can change the course in Allied Health Science subjects from one to another subject to the availability of clear vacancy and with the prior approval of the university.

By order,

sd/-

REGISTRAR

Copy to :

1. The Secretary to his excellency the Governor's Secretariat Raj Bhavan, Bangalore - 560001
2. Secretary to Government, Health & Family Welfare Department, (Medical Education), Vikasa Soudha, Bangalore - 560001.
3. The Director, Department of Medical Education, Anand Rao Circle, Bangalore.
4. PA to Vice - Chancellor / Registrar / Registrar (Eva.) / Finance Officer.
5. Director, Curriculum Development Cell.
6. Public Information officer.
7. The home Page of RGUHS Website.
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SECTION I

REGULATIONS GOVERNING B.Sc. MEDICAL LABORATORY TECHNOLOGY

1. Title of the Courses offered in Allied Health Sciences:

- | | |
|---|------------------------------------|
| 1. Bachelor of Science in Medical Laboratory Technology | [B.Sc. (M.L.T)] |
| 2. Bachelor of Science in Operation Theatre Technology | [BSc .O.T. Technology] |
| 3. Bachelor of Science in Cardiac Care Technology | [B.Sc Cardiac Care Technology] |
| 4. Bachelor of Science in Perfusion Technology | [BSc. Perfusion Technology] |
| 5. Bachelor of Science in Neuro Science Technology | [BSc. Neuro Science Technology] |
| 6. Bachelor of Science in. Renal Dialysis Technology | [BSc. Renal Dialysis Technology] |
| 7. Bachelor of Science in Respiratory Care Technology | [BSc. Respiratory Care Technology] |
| 8. Bachelor of Science in Anaesthesia Technology | [BSc. Anaesthesia Technology] |
| 9. Bachelor of Science in Imaging Technology | [BSc. Imaging Technology] |
| 10. Bachelor of Science in Radiotherapy Technology | [BSc. Radiotherapy Technology] |

2. Eligibility for admission:

A candidate seeking admission to the Bachelor of Science Degree Courses in the Allied Health Sciences course from Sl.No. 1 to 10 shall have studied English as one of the principal subject during the tenure of the course and for those seeking admission to the Bachelor of Science Degree Courses in the Allied Health Sciences courses from Sl.No. 1 to 8 mentioned above except for B.Sc. Imaging Technology and B.Sc. Radiotherapy Technology shall have passed:

1. Two year Pre-University examination or equivalent as recognized by Rajiv Gandhi University of Health Sciences with, Physics, Chemistry and Biology as principal subjects of study.
OR
2. Pre-Degree course from a recognized University considered as equivalent by RGUHS, (Two years after ten years of schooling) with Physics, Chemistry and Biology as principal subjects of study.
OR
3. Any equivalent examination recognized by the Rajiv Gandhi University of Health Sciences, Bangalore for the above purpose with Physics, Chemistry and Biology as principal subjects of study.
OR
4. The vocational higher secondary education course conducted by Vocational Higher Secondary Education, Government of Kerala with five subjects including Physics, Chemistry, Biology and English in addition to vocational subjects conducted is considered equivalent to plus TWO examinations of Government of Karnataka Pre University Course.
OR

5. Candidates with two years diploma from a recognized Government Board in a subject for which the candidate desires to enroll, in the respective Allied Health Sciences course mentioned in Sl. No. 1 to 10 shall have passed plus 12 [10+2] with Physics, Chemistry and Biology, as principle subjects or candidates with 3 years diploma from a recognized Government Board in a subject for which the candidate desires to enroll, in the respective Allied Health Sciences course mentioned in Sl. No. 1 to 10 should have studied Physics, Biology and Chemistry as principal subjects during the tenure of the course.
6. Lateral entry to second year for allied health science courses for candidates who have passed diploma program from the Government Boards and recognized by RGUHS, fulfilling the conditions specified above under sl. No. 5 and these students are eligible to take admission on lateral entry system only in the same subject studied at diploma level from the academic year 2008-09 vide RGUHS Notification no. AUTH/AHS/317/2008-09 dated 01.08.2008.
7. In case of admission to B.Sc. Imaging Technology Or B.Sc. Radiotherapy Technology the candidate should have passed Pre-University or equivalent examination with Physics, Chemistry, Biology and Mathematics, as principal subjects of study.

Note:

- a. The candidate shall have passed individually in each of the principal subjects.
- b. Candidates who have completed diploma or vocational course through Correspondence shall not be eligible for any of the courses mentioned above.

3. Duration of the course:

Duration shall be for a period of three and half years including six months of Internship.

4. Medium of instruction:

The medium of instruction and examination shall be in English.

5. Scheme of examination:

There shall be three examinations one each at the end of 1st, 2nd and 3rd year.

6. Attendance

Every candidate should have attended at least 80% of the total number of classes conducted in an academic year from the date of commencement of the term to the last working day as notified by university in each of the subjects prescribed for that year separately in theory and practical. Only such candidates are eligible to appear for the university examinations in their first attempt. Special classes conducted for any purpose shall not be considered for the calculation of percentage of attendance for eligibility. A candidate lacking in prescribed percentage of attendance in any subjects either in theory or practical in the first appearance will not be eligible to appear for the University Examination in that subject

7. Internal Assessment (IA):

1st Year B.Sc. MLT

Theory - 20 marks.

Practicals - 10 marks* . [Lab work- 06 marks and Record-04 marks]

2nd & 3rd year B.Sc. (Medical Laboratory Technology)

Theory - 20 Marks

Practicals - 20 Marks

There shall be a minimum of two periodical tests preferably one in each term in theory and practical of each subject in an academic year. The average marks of the two tests will be calculated and reduced to 20. The marks of IA shall be communicated to the University at least 15 days before the commencement of the University examination. The University shall have access to the records of such periodical tests.

The marks of the internal assessment must be displayed on the notice board of the respective colleges with in a fortnight from the date test is held.

If a candidate is absent for any one of the tests due to genuine and satisfactory reasons, such a candidate may be given a re-test within a fortnight.

* There shall be no University Practical Examination in First year.

8. Subject and hours of teaching for Theory and Practicals

The number of hours of teaching theory and practical, subject wise in first year, second year and third year are shown in Table-I, Table-II and Table-III. Main and Subsidiary subjects are common in first year for all the courses in Allied Health Science.

The number of hours for teaching theory and practical for main subjects in first, Second and Third year are shown in Table-I, II and III.

Table - I Distribution of Teaching Hours in First Year Subjects

Main Subjects

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Total No. of Hours
1.	Human Anatomy	70	20	90
2.	Physiology	70	20	90
3.	Biochemistry I	70	20	90
4.	Pathology I (Clinical Pathology, Hematology & Blood Banking)	70	20	90
5.	Microbiology I	70	20	90
	Total	350	100	450

The classes in main and subsidiary subjects are to be held from Monday to Thursday. On Fridays and Saturdays students shall work in hospitals in the respective specialty or department chosen by them

Subsidiary Subjects

English 25 Hours
Kannada 25 Hours
Health-Care 40 Hours
Clinical/Labposting -470Hours-
Fri day 9am - 1pm and 2pm - 4-30 pm
Saturday 9am - 1pm

Table - II Distribution of Teaching Hours in Second Year Subjects
Main Subjects

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Clinical posting	Total No. of Hours
1.	Biochemistry II	100	80	170	350
2.	Microbiology II	100	80	170	350
3.	Pathology II	100	80	170	350
	Total	300	240	510	1050

Subsidiary Subjects:

Sociology 20 Hours
Constitution of India 10 Hours
Environmental Science &Health 10 Hours

Table -III Distribution of Teaching Hours in Third Year Subjects
Main Subjects

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Clinical posting	Total No. of Hours
1.	Biochemistry III	100	80	170	350
2.	Microbiology III	100	80	170	350
3.	Pathology III	100	80	170	350
	Total	300	240	510	1050

Subsidiary Subjects

Ethics, Database Management 50 Hours
Research & Biostatistics 20 Hours
Computer application 10 Hours



9. Schedule of Examination:

The university shall conduct two examinations annually at an interval of not less than 4 to 6 months as notified by the university from time to time. A candidate who satisfies the requirement of attendance, progress and conduct as stipulated by the university shall be eligible to appear for the university examination. Certificate to that effect shall be produced from the Head of the institution along with the application for examination and the prescribed fee.

10. Scheme of Examination

There shall be three examinations, one each at the end of I, II and III year. The examination for both main and subsidiary subjects for all courses in Allied Health Sciences shall be common in the first year. Distribution of Subjects and marks for First Year, Second year & Third year University theory and practical Examinations are shown in the Table - IV, V & VI.

First year examination:

The University examination for 1st year shall consist of only theory examination and there shall be no University Practical Examination.

Second & Third year examination:

The University examination for 2nd and 3rd year shall consist of Written Examination & Practical.

Written Examinations consists of

03 papers in the 2nd Year

03 papers in the 3rd Year.

Practical examination:

Three practical examinations, at the end 2nd Year and three practical examinations at the end of the 3rd year.

TABLE-IV
Distribution of Subjects and marks for First Year University theory Examination

A	Main Subjects*	Written Paper		I .A Theory	Total
		Duration	Marks	Marks	Marks
1.	Basic Anatomy [Including Histology]	3 hours	80	20	100
2.	Physiology	3 hours	80	20	100
3.	Biochemistry	3 hours	80	20	100
4.	Pathology	3 hours	80	20	100
5.	Microbiology	3hours	80	20	100
	Subsidiary Subject**				Total
1.	English	3 hours	80	20	100
2.	Kannada	3 hours	80	20	100
3.	Health Care	3 hours	80	20	100

Note: * IA = Internal Assessment

Main Subjects shall have University Examination.
There Shall be no University Practical Examination.

** Subsidiary subjects : Examination for subsidiary subjects shall be conducted by respective colleges.

TABLE - V
Distribution of Subjects and marks for Second Year Examination of B.Sc. MLT

		Theory			Practicals			
Paper	Subject	Univ. Exam.	IA	Sub Total	Univ. Practical	IA	Sub Total	Grand Total
i	Biochemistry II	80	20	100	80	20	100	200
ii	Microbiology II	80	20	100	80	20	100	200
iii	Pathology II	80	20	100	80	20	100	200

Distribution of Subsidiary Subjects and marks for Second Year Examination of B.Sc. MLT

B	Subsidiary Subject**	Duration	Marks	I .A Theory Marks	Total Marks
1.	Sociology	3 hours	80	20	100
2.	Constitution of India	3 hours	80	20	100
3.	Environmental Science &Health	3 hours	80	20	100

** Subsidiary subjects: Examination for subsidiary
Subjects shall be conducted by respective colleges

TABLE - VI
Distribution of Subjects and marks for Third Year Examination of B.Sc. MLT

Paper	Subject	Theory			Practicals			Grand Total
		Univ. Exam.	IA	Sub Total	Univ. Practical	IA	Sub Total	
i	Biochemistry III	80	20	100	80	20	100	200
ii	Microbiology III	80	20	100	80	20	100	200
iii	Pathology III	80	20	100	80	20	100	200

**Distribution of Subsidiary Subjects and marks for Third Year
Examination of B.Sc. MLT**

B	Subsidiary Subject**	Duration	Marks	I .A Theory Marks	Total Marks
1.	Ethics, Database Management	3 hours	80	20	100
2.	Research & Biostatistics	3 hours	80	20	100
3.	Computer application	3 hours	80	20	100

** Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges

11. Pass criteria

11.1. First year examination.

- Main Subjects: A candidate is declared to have passed in a subject, if he/she secures, 50% of marks in University Theory exam and internal assessment added together.
- Subsidiary Subjects: The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the Commencement of the University examination.

11.2. Second and Third year Examination

- Main Subjects: A candidate is declared to have passed the examination in a subject if he/she secures 50% of the marks in Theory and 50% in practical separately. For a pass in theory, a candidate has to secure a minimum of 40% marks in the University conducted written examination,

and 50% in aggregate in the University conducted written examination and internal assessment added together and for pass in Practical, a candidate has to secure a minimum of 40% marks in the university conducted Practical/Clinical examination and 50% in aggregate i.e. University conducted Practical/Clinical and Internal Assessment.

- b. **Subsidiary Subjects:** The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the commencement of the University examination.

12. Carry over benefit

12.1 First year examination:

A candidate who fails in any two of the five main subjects of first year shall be permitted to carry over those subjects to second year. However, he/she must pass the carry over subjects before appearing for second year examination; otherwise he/she shall not be permitted to proceed to third year.

12.2. Second year examination.

A candidate is permitted to carry over any one main subject to the third year but shall pass this subject before appearing for the third year examination

13. Declaration of Class

- a. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have passed the examination with Distinction.
- b. A candidate having appeared in all subjects in the same examination and passed that examination in the first attempt and secures 60% of marks or more but less than 75% of grand total marks prescribed will be declared to have passed the examination in First Class.
- c. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 60% of grand total marks prescribed will be declared to have passed the examination in Second Class.
- d. A candidate passing the university examination in more than one attempt shall be placed in Pass class irrespective of the percentage of marks secured by him/her in the examination.
- e. The marks obtained by a candidate in the subsidiary subjects shall not be considered for award of Class or Rank.

[Please note fraction of marks should not be rounded off clauses (a), (b) and ©]

14. Eligibility for the award of Degree:

A candidate shall have passed in all the subjects of first, second and third year to be eligible for award of degree.

15. Distribution of Type of Questions and Marks for Various Subjects

THEORY

SUBJECTS HAVING MAXIMUM MARKS = 100		
Type of Questions	No of Questions	Marks For Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	12 (10 x 5)	05
Short Answers Type	12 (10 x 3)	03

SUBJECTS HAVING MAXIMUM MARKS = 80		
Type of Questions	No of Questions	Marks For Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answers Type	12 (10 x 3)	03

SUBJECTS HAVING MAXIMUM MARKS = 60		
Type of Questions	No of Questions	Marks For Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	7 (5 x 5)	05
Short Answers Type	7 (5 x 3)	03

SUBJECTS HAVING MAXIMUM MARKS = 50		
Type of Questions	No of Questions	Marks For Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	5 (3 x 5)	05
Short Answers Type	7 (5 x 3)	03

SECTION II

COURSE CONTENTS FIRST YEAR MAIN SUBJECTS

ANATOMY

No. of theory classes: 70 hours

No. of practical classes : 20 hours

1. Introduction: Human body as a whole

Theory:

Definition of anatomy and its divisions

Terms of location, positions and planes

Cell and its organelles

Epithelium-definition, classification, describe with examples, function

Glands- classification, describe serous & mucous glands with examples

Basic tissues - classification with examples

Practical: Histology of types of epithelium

Histology of serous, mucous & mixed salivary gland

2. Locomotion and support

Theory:

Cartilage - types with example & histology

Bone - Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull

Joints - Classification of joints with examples, synovial joint (in detail for radiology)

Muscular system: Classification of muscular tissue & histology

Names of muscles of the body

Practical: Histology of the 3 types of cartilage

Demo of all bones showing parts, radiographs of normal bones & joints

Histology of compact bone (TS & LS)

Demonstration of all muscles of the body

Histology of skeletal (TS & LS), smooth & cardiac muscle

3. Cardiovascular system

Theory:

Heart-size, location, chambers, exterior & interior

Blood supply of heart

Systemic & pulmonary circulation

Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery

Peripheral pulse
Inferior venacava, portal vein, portosystemic anastomosis
Great saphenous vein
Dural venous sinuses
Lymphatic system- cisterna chyli & thoracic duct
Histology of lymphatic tissues
Names of regional lymphatics, axillary and inguinal lymph nodes in brief
Practical: Demonstration of heart and vessels in the body
Histology of large artery, medium sized artery & vein, large vein
Microscopic appearance of large artery, medium sized artery & vein, large vein pericardium
Histology of lymph node, spleen, tonsil & thymus
Normal chest radiograph showing heart shadows
Normal angiograms

4. Gastro-intestinal system

Theory:

Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring)

Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas Radiographs of abdomen

5. Respiratory system

Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments

Histology of trachea, lung and pleura

Names of paranasal air sinuses

Practical : Demonstration of parts of respiratory system.

Normal radiographs of chest

Histology of lung and trachea

6. Peritoneum

Theory: Description in brief

Practical: Demonstration of reflections

7. Urinary system

Kidney, ureter, urinary bladder, male and female urethra

Histology of kidney, ureter and urinary bladder

Practical: demonstration of parts of urinary system

Histology of kidney, ureter, urinary bladder

Radiographs of abdomen-IVP, retrograde cystogram

8. Reproductive system

Theory:

Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)

Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)

Mammary gland - gross

Practical: demonstration of section of male and female pelvis with organs in situ

Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary
Radiographs of pelvis - hysterosalpingogram

9. Endocrine glands

Theory:

Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland - (gross & histology)

Practical: Demonstration of the glands

Histology of pituitary, thyroid, parathyroid, suprarenal glands

10. Nervous system

Theory:

Neuron

Classification of NS

Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology)

Meninges, Ventricles & cerebrospinal fluid

Names of basal nuclei

Blood supply of brain

Cranial nerves

Sympathetic trunk & names of parasympathetic ganglia

Practical: Histology of peripheral nerve & optic nerve

Demonstration of all plexuses and nerves in the body

Demonstration of all part of brain

Histology of cerebrum, cerebellum, spinal cord

11. Sensory organs:

Theory:

Skin: Skin-histology

Appendages of skin

Eye: Parts of eye & lacrimal apparatus

Extra-ocular muscles & nerve supply

Ear: parts of ear- external, middle and inner ear and contents

Practical: Histology of thin and thick skin

Demonstration and histology of eyeball

Histology of cornea & retina

12. Embryology:

Theory:

Spermatogenesis & oogenesis

Ovulation, fertilization

Fetal circulation

Placenta

Internal Assessment

Theory - Average of two exams conducted.	20
Practicals: Record & Lab work*	10

* There shall be no University Practical Examination and internal assessment marks secured in Practicals need not be sent to the University.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Anatomy shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

NO PRACTICAL EXAMINATION

REFERENCE BOOKS

Anatomy

1. William Davis (P) understanding Human Anatomy and Physiology MC Graw Hill
2. Chaurasia -A Text book of Anatomy
T. S. Ranganathan - A text book of Human Anatomy
3. Fattana, Human anatomy
(Description and applied)
Saunders & C P Prism Publishers, Bangalore - 1991
4. ESTER . M. Grishcimer,
Physiology & Anatomy with Practical
Considerations, J.P. Lippin Cott. Philadelphia
5. Bhatnagar
Essentials of Human embryology - Revised Edition
Orient Blackswan Pvt. Ltd.

PHYSIOLOGY

Theory 70 hours

Practical 20hours

Introduction

composition and function of blood

Red blood cells - Erythropoiesis, stages of differentiation function, count physiological Variation.

Haemoglobin -structure, function, concentration physiological variation

Methods of Estimation of Hb

White blood cells - Production, function, life span, count, differential count

Platelets - Origin, normal count, morphology functions.

Plasma Proteins - Production, concentration, types, albumin, globulin, Fibrinogen, Prothrombin functions.

Haemostasis & Blood coagulation

Haemostasis - Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.

Blood Bank

Blood groups - ABO system, Rh system

Blood grouping & typing

Crossmatching

Rh system - Rh factor, Rh incompatibility.

Blood transfusion - Indication, universal donor and recipient concept.

Selection criteria of a blood donor. transfusion reactions

Anticoagulants - Classification, examples and uses

Anaemias : Classification - morphological and etiological. Effects of anemia on body

Blood indices - Colour index, MCH, MCV, MCHC

Erythrocyte sedimentation Rate (ESR) and Packed cell volume

Normal values, Definition. Determination,

Blood Volume -Normal value, determination of blood volume and regulation of blood volume

Body fluid - pH, normal value, regulation and variation

Lymph - lymphoid tissue formation, circulation, composition and function of lymph

Cardiovascular system

Heart - Physiological Anatomy, Nerve supply

Properties of Cardiac muscle, Cardiac cycle-systole, diastole. Intraventricular pressure curves.

Cardiac Output - only definition

Heart sounds Normal heart sounds Areas of auscultation.

Blood Pressure - Definition, normal value, clinical measurement of blood pressure.

Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension.

Pulse - Jugular, radial pulse, Triple response

Heart sounds - Normal heart sounds, cause characteristics and signification. Heart rate

Electrocardiogram (ECG) -significance.

Digestive System

Physiological anatomy of Gastro intestinal tract, Functions of digestive system

Salivary glands - Structure and functions. Deglutination -stages and regulation

Stomach - structure and functions

Gastric secretion - Composition function regulation of gastric juice secretion

Pancreas - structure, function, composition, regulation of pancreatic juice

Liver - functions of liver

Bile secretion, composition, function, regulation of bile secretion. Bilirubin metabolism types of bilirubin, Vandernberg reaction, Jaundice- types, significance.

Gall bladder - functions

Intestine - small intestine and large intestine

Small intestine -Functions- Digestion, absorption,,movements.

Large intestine - Functions, Digestion and absorption of Carbohydrates, Proteins, Fats, Lipids.

Defecation

Respiratory system

Functions of Respiratory system, Physiological Anatomy of Respiratory system, Respiratory tract, Respiratory Muscles, Respiratory organ-lungs, Alveoli, Respiratory membrane, stages of respiration.

Mechanism of normal and rigorous respiration. Forces opposing and favouring expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall. H

Transportation of Respiratory gases:

Transportation of Oxygen: Direction, pressure gradient, Forms of transportation, Oxygenation of Hb. Quantity of Oxygen transported.

Lung volumes and capacities

Regulation of respiration what? Why? How? Mechanisms of Regulation, nervous and chemical regulation. Respiratory centre. Hearing Brier, Reflexes.

Applied Physiology and Respiration : Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.

Endocrine System

Definition, Classification of Endocrine glands & their Hormones Properties of Hormones.

Thyroid gland hormone - Physiological, Anatomy, Hormone secreted, Physiological function, regulation of secretion. Disorders - hypo and hyper secretion of hormone

Adrenal gland, Adrenal cortex physiologic anatomy of adrenal gland, Adrenal cortex, cortical hormones - functions and regulation Adrenal medulla - Hormones, regulation and secretion. Functions of Adrenaline and nor adrenaline,

Pituitary hormones - Anterior and posterior pituitary hormones, secretion, function

Pancreas - Hormones of pancreas Insulin - secretion, regulation, function and action
Diabetes mellitus - Regulation of blood glucose level
Parathyroid gland - function, action, regulation of secretion of parathyroid hormone.
Calcitonin - function and action

Special senses

Vision - structure of eye. Function of different parts.
Structure of retina
Hearing structure and function of can mechanism of hearing
Taste - Taste buds functions. Smell physiology, Receptors.

Nervous system

Functions of Nervous system, Neuron structure, classification and properties. Neuroglia, nerve fiber, classification, conduction of impulses continuous and saltatory. Velocity of impulse transmission and factors affecting. Synapse - structure, types, properties. Receptors - Definition, classification, properties. Reflex action - unconditioned properties of reflex action. Babinski's sign. Spinal cord nerve tracts. Ascending tracts, Descending tracts -

Pyramidal tracts -

Extrapyramidal tracts. Functions of Medulla, pons, Hypothalamic disorders. Cerebral cortex lobes and functions, Sensory cortex, Motor cortex, Cerebellum functions of Cerebellum. Basal ganglion-functions. EEG.
Cerebro Spinal Fluid(CSF) : formation, circulation, properties, composition and functions lumbar puncture.

Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions and comparison of functions.

Excretory System

Excretory organs

Kidneys: Functions of kidneys structural and functional unit nephron, vasarecta, cortical and juxtamedullary nephrons - Comparision, Juxta Glomerular Apparatus -Structure and function. Renal circulation peculiarities.

Mechanism of Urine formation: Ultrafiltration criteria for filtration GFR, Plasma fraction, EFP, factors effecting EFR. Determination of GFR selective reabsorption - sites of reabsorption, substance reabsorbed, mechanisms of reabsorption Glucose, urea.

H + Cl aminoacids etc. TMG, Tubular load, Renal threshold % of reabsorption of different substances, selective e secretion.

Properties and composition of normal urine, urine output. Abnormal constituents in urine, Mechanism of urine concentration.

Counter - Current Mechanisms : Micturition, Innervation of Bladder, Cystourethrogram.

Diuretics : Water, Diuretics, osmotic diuretics, Artificial kidney Renal function tests - plasma clearance

Actions of ADH, Aldosterone and PTH on kidneys. Renal function tests

Reproductive system

Function of Reproductive system, Puberty

Male reproductive system- Functions of testes, spermatogenesis site, stages, factors influencing semen. Endocrine functions of testes

Androgens - Testosterone structure and functions.

Female reproductive system. Ovulation, menstrual cycle. Physiological changes during pregnancy, pregnancy test.

Lactation : Composition of milk factors controlling lactation.

Muscle nerve physiology

Classification of muscle, structure of skeletal muscle, Sarcomere contractile proteins, Neuromuscular junction. Transmission across, Neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue Rigour mortis

Skin - structure and function

Body temperature measurement, Physiological variation, Regulation of body Temperature by physical chemical and nervous mechanisms .Role of Hypothalamus, Hypothermia and fever.

Practicals

Haemoglobinometry

White Blood Cell count

Red Blood Cell count

Determination of Blood Groups

Leishman's staining and Differential WBC count

Determination of packed cell Volume

Erythrocyte sedimentation rate [ESR]

Calculation of Blood indices

Determination of Clotting Time, Bleeding Time

Blood pressure Recording

Auscultation for Heart Sounds

Artificial Respiration

Determination of vital capacity

Internal Assessment

Theory - Average of two exams conducted.	20
Practicals: Record & Lab work*	10

* There shall be no University Practical Examination and internal assessment marks secured in Practicals need not be sent to the University.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Physiology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

**NO PRACTICAL EXAMINATION
REFERENCE BOOKS**

Physiology

1. Guyton (Arthur) Text Book of Physiology.
Latest Ed. Prism publishers
2. Chatterjee(CC) Human Physiology Latest Ed.
Vol-1, Medical Allied Agency
3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book,
4. Ganong (William F) Review of Medical
Physiology. Latest Ed . Appleton

BIOCHEMISTRY

No. Theory classes: 70hours

No. of practical classes: 20 hours

Theory:

Specimen collection: Pre-analytical variables
Collection of blood
Collection of CSF & other fluids
Urine collection
Use of preservatives
Anticoagulants

1. Introduction to Laboratory apparatus

Pipettes- different types (Graduated, volumetric, Pasteur, Automatic etc.,)

Calibration of glass pipettes

Burettes, Beakers, Petri dishes, depression plates.

Flasks - different types (Volumetric, round bottomed, Erlenmeyer conical etc.,)

Funnels - different types (Conical, Buchner etc.,)

Bottles - Reagent bottles - graduated and common, Wash bottles - different type Specimen bottles etc.,

2. Measuring cylinders, Porcelain dish

Tubes - Test tubes, centrifuge tubes, test tube draining rack

Tripod stand, Wire gauze, Bunsen burner.

Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range, cuvette holders

Racks - Bottle, Test tube, Pipette

Dessicator, Stop watch, rimers, scissors

Dispensers - reagent and sample

Any other apparatus which is important and may have been missed should also be covered

Maintenance of lab glass ware and apparatus:

Glass and plastic ware in Laboratory

* use of glass: significance of boro silicate glass; care and cleaning of glass ware, different cleaning solutions of glass

* care and cleaning of plastic ware, different cleaning solution

3. Instruments (Theory and demonstration) Diagrams to be drawn

Water bath: Use, care and maintenance

Oven & Incubators : Use, care and maintenance.

Water Distillation plant and water deionisers. Use, care and maintenance

Refrigerators, cold box, deep freezers - Use, care and maintenance

Reflux condenser : Use, care and maintenance

Centrifuges (Theory and demonstration) Diagrams to be drawn

Definition, Principle, svedberg unit, centrifugal force, centrifugal field rpm, ref. Conversion of G to rpm and vice versa.

Different types of centrifuges

Use care and maintenance of a centrifuge

Laboratory balances (Theory & Practicals) Diagrams to be drawn

Manual balances: Single pan, double pan, trip balance

Direct read out electrical balances.

Use care and maintenance. Guideline to be followed and precautions to be taken while weighing

Weighing different types of chemicals, liquids. Hygroscopic compounds etc.

Colorimeter and spectrophotometer (Theory and Practicals) Diagrams to be drawn

Principle, Parts Diagram.

Use, care and maintenance.

pH meter (Theory & practicals) Diagrams to be drawn

principle, parts, Types of electrodes, salt bridge solution.

Use, care and maintenance of Ph meter and electrodes

Guidelines to be followed and precautions to be taken while using pH meter

4. Safety measurements

5. Conventional and SI units

6. Atomic structure

Dalton's theory, Properties of electrons, protons, neutrons, and nucleus, Rutherford's model of atomic structure, Bohr's model of atomic structure, orbit and orbital, Quantum numbers, Heisenberg's uncertainly principle.

Electronic configuration - Aufbau principle, Pauli's exclusion principle, etc.

Valency and bonds - different types of strong and weak bonds in detail with examples

Theory & Practicals for all the following under this section

Molecular weight, equivalent weight of elements and compounds, normality, molarity

Preparation of molar solutions (mole/litre solution) eg: 1 M NaCl, 0.15 M NaCl

1 M NaOH, 0.1 M HCl, 0.1 M H₂SO₄ etc.,

Preparation of normal solutions. eg., 1N Na₂CO₃, 0.1N Oxalic acid, 0.1 N HCl, 0.1N H₂SO₄, 0.66 N H₂SO₄ etc.,

Percent solutions. Preparation of different solutions - v/v w/v (solids, liquids and acids)

Conversion of a percent solution into a molar solution

Dilutions

Diluting solutions: eg. Preparation of 0.1 N NaCl from 1 N NaCl from 2 N NaCl etc., Preparing working standard from stock standard, Body fluid dilutions, Reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc.,

Saturated and supersaturated solutions. Standard solutions. Technique for preparation of standard solutions eg: Glucose, urea, etc., Significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl₂, potassium carbonate, sodium hydroxide etc.,) Preparation of standards using conventional and SI units Acids, bases, salts and indicators.

Acids and Bases: Definition, physical and chemical properties with examples. Arrhenius concept of acids and bases, Lowery - Bronsted theory of acids and bases classification of acids and bases. Different between bases and alkali, acidity and basicity, monoprotonic and polyprotonic acids and bases. Concepts of acid base reaction, hydrogen ion concentration, Ionisation of water, buffer, Ph value of a solution, preparation of buffer solutions using Ph meter.

Salts: Definition, classification, water of crystallization - definition and different types, deliquescent and hygroscopic salts

Acid- base indicators: (Theory and Practicals)

Theory - Definition, concept, mechanism of dissociation of an indicator, colour change of an indicator in acidic and basic conditions, use if standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators and their pH range, suitable pH indicators used in different titrations, universal indicators

Practicals - Titration of a simple acid and a base (Preparation of standard solution of oxalic acid and using this solution finding out the normality of a sodium hydroxide solution. Acid to be titrated using this base) Calculation of normality of an acid or a base after titration, measurement of hydrogen ion concentration

Quality control:

- Accuracy
- Precision
- Specificity
- Sensitivity
- Limits of error allowable in laboratory
- Percentage error

Normal values and Interpretations

Special Investigations:

- Serum Electrophoresis
- Immunoglobulins
- Drugs: Digitoxin, Theophyllines

Regulation of Acid Base status:

- Henderson Hasselback Equations
- Buffers of the fluid

pH Regulation
Disturbance in acid Base Balance
Anion Gap

Metabolic acidosis

Metabolic acidosis

Metabolic alkalosis

Respiratory acidosis

Respiratory alkalosis

Basic Principles and estimation of Blood Gases and pH

Basic principles and estimation of Electrolytes

Water Balance

Sodium regulation

Bicarbonate buffers

Nutrition, Nutritional support with special emphasis on parental nutrition.

Calorific Value

Nitrogen Balance

Respiratory Quotient

Basal metabolic rate

Dietary Fibers

Nutritional importance of lipids, carbohydrates and proteins

Vitamins

PRACTICALS

1. Analysis of Normal Urine

Composition of urine

Procedure for routine screening

Urinary screening for inborn errors of metabolism

Common renal disease

2. Urinary calculus

Urine examination for detection of abnormal constituents

Interpretation and Diagnosis through charts

Liver Function tests

3. Lipid Profile

Renal Function test

Cardiac markers

Blood gas and Electrolytes

4. Estimation of Blood sugar, Blood Urea and electrolytes

Demonstration of Strips

5. Demonstration of Glucometer

Internal Assessment

Theory - Average of two exams conducted.

20

Practicals: Record & Lab work*

10

* There shall be no University Practical Examination and internal assessment marks secured in Practicals need not be sent to the University.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Biochemistry shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

NO PRACTICAL EXAMINATION REFERENCE BOOKS

Biochemistry

1. Varley - Clinical chemistry
2. TEITZ - Clinical chemistry
3. Kaplan - Clinical chemistry
4. Ramakrishna(S) Prasanna(KG), Rajna ® Text book of Medical Biochemistry Latest Ed Orient longman Bombay -1980
5. Vasudevan (DM) Sreekumari(S) Text book of Biochemistry for Medical students ,Latest Ed
6. DAS(Debajyothi) Biochemistry Latest ED Academic, Publishers, Culcutta - 1992
7. Rajagopal G & Ramakrishna - 1983
Practical Biochemistry for Medical Students
Oriental Blackswan Pvt. Ltd.
8. Practical Bio-chemistry for medical students - Rajagopal, Orient Longman Pvt Ltd

PATHOLOGY

Histo Pathology ,Clinical Pathology, Haematology and Blood Banking

Theory - 70 hours

Practical - 20 hours

HistoPathology - Theory

- Introduction to Histo Pathology
- Receiving of Specimen in the laboratory
- Grossing Techniques
- Mounting Techniques - various Mountants
- Maintenance of records and filing of the slides.
- Use & care of Microscope
- Various Fixatives, Mode of action, Preparation and Indication.
- Bio-Medical waste management
- Section Cutting
- Tissue processing for routine paraffin sections
- Decalcification of Tissues.
- Staining of tissues - H& E Staining

Clinical Pathology - Theory

- Introduction to Clinical Pathology
- Collection, Transport, Preservation, and Processing of various clinical specimens
- Urine Examination - Collection and Preservation of urine.

Physical, chemical, Microscopic Examination

- Examination of body fluids.
- Examination of cerebrospinal fluid (CSF)
- Sputum Examination.
- Examination of feces

Haematology - Theory

- Introduction to Haematology
- Normal constituents of Blood, their structure and function.
- Collection of Blood samples
- Various Anticoagulants used in Haematology
- Various instruments and glassware used in Haematology, Preparation and use of glassware
- Laboratory safety guidelines
- SI units and conventional units in Hospital Laboratory
- Hb, PCV
- ESR
- Normal Haemostasis

Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.

Blood Bank
Introduction
Blood grouping and Rh Types
Cross matching

PRACTICALS

- Urine Examination.
 - Physical
 - Chemical
 - Microscopic
- Blood Grouping, Rh typing.
- Hb Estimation, Packed Cell Volume [PCV], Erythrocyte Sedimentation rate {ESR}
- Bleeding Time, Clotting Time.
- Histopathology - Section cutting and H & E Staining. [For BSc MLT only]

Internal Assessment

Theory - Average of two exams conducted. 20
Practicals: Record & Lab work* 10

* There shall be no University Practical Examination and internal assessment marks secured in Practical need not be sent to the University.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Pathology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

NO PRACTICAL EXAMINATION

REFERENCE BOOKS

Pathology

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss - cytology
4. Winifred greg - Diagnostic cytopathology
5. Orell - Cyto Pathology
6. Todd & Sanford Clinical Diagnosis by laboratory method
7. Dacie & Lewis - Practical Haematology
8. Ramanic Sood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros, New Delhi -1996)
9. Satish Gupta Short text book of Medical Laboratory for technician, J.P. Bros, New Delhi - 1998
10. Sachdev K.N. Clinical Pathology and Bacteriology 8th Ed, J.P. Bros, New Delhi-1991.
11. Krishna - Text book of Pathology, Orient Longman PVT Ltd. Bacteriology 8th Ed J.P. Bros. New Delhi 1991.

MICROBIOLOGY

Objective : This course introduces the principles of Microbiology with emphasis on applied aspects of Microbiology of infectious diseases particularly in the following areas Principles & practice of sterilization methods.

Collection and dispatch of specimens for routine microbiological investigations.

Interpretation of commonly done bacteriological and serological investigations.

Control of Hospital infections

Biomedical waste management

Immunization schedule

Theory - 70 hours

1. Morphology 4 hours
Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.
2. Growth and nutrition 4 hours
Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.
3. Sterilisation and Disinfection 4 hours
Principles and use of equipments of sterilization namely Hot Air oven, Autoclave and serum inspissator. Pasteurization, Antiseptic and disinfectants. Antimicrobial sensitivity test
4. Immunology 6 hours
Immunity Vaccines, Types of Vaccine and immunization schedule Principles and interpretation of commonly done serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA. Rapid tests for HIV and HbsAg (Technical details to be avoided)
5. Systematic Bacteriology 20 hours
Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria(the classification, antigenic structure and pathogenicity are not to be taught) Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, Esch coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes
6. Parasitology 10 hours
Morphology, life cycle, laboratory diagnosis of following parasites
E. histolytica, Plasmodium, Tape worms, Intestinal nematodes
7. Mycology 4 hours
Morphology, diseases caused and lab diagnosis of following fungi.

Candida, Cryptococcus, Dermatophytes ,opportunistic fungi.

- | | |
|--|----------|
| 8. Virology | 10 hours |
| General properties of viruses, diseases caused, lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis. | |
| 9. Hospital infection Causative agents, transmission methods, investigation, prevention and control | |
| Hospital infection. | 4 hours |
| 10. Principles and practice Biomedical waste management | 4 hours |

Practical

20 hours

Compound Microscope.

Demonstration and sterilization of equipments - Hot Air oven, Autoclave, Bacterial filters.

Demonstration of commonly used culture media, Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media, Potassium tellurite media with growth, Mac with LF & NLF, NA with staph

Antibiotic susceptibility test

Demonstration of common serological tests - Widal, VDRL, ELISA.

Grams stain

Acid Fast staining

Stool exam for Helminthic ova

Visit to hospital for demonstration of Biomedical waste management.

Anaerobic culture methods.

Internal Assessment

Theory - Average of two exams conducted.	20
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Practicals: Record & Lab work*	10
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* There shall be no University Practical Examination and internal assessment marks secured in Practical need not be sent to the University.

Scheme of Examination

Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Microbiology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

NO PRACTICAL EXAMINATION REFERENCE BOOKS

Microbiology

1. Anathanarayana & Panikar Medical Microbiology - Revised 8th Edition University Press
2. Robert Cruickshank - Medical Microbiology - The Practice of Medical Microbiology
3. Chatterjee - Parasitology - Interpretation to Clinical medicine.
4. Rippon - Medical Mycology
5. Emmons - Medical Mycology
6. Basic Laboratory methods in Parasitology, 1st Ed, J P Bros, New Delhi - 199
7. Basic laboratory procedures in clinical bacteriology, 1st Ed, J P Brothers, New Delhi
8. Medical Parasitology - Ajit Damle
9. Introduction to medical microbiology - Ananthanarayana - Orient Longman Pvt Ltd

SUBSIDIARY SUBJECTS

ENGLISH

COURSE OUTLINE

COURSE DESCRIPTION: This course is designed to help the student acquire a good command and comprehension of the English language through individual papers and conferences.

BEHAVIOURAL OBJECTIVES:

The student at the end of training is able to

1. Read and comprehend English language
2. Speak and write grammatically correct English
3. Appreciates the value of English literature in personal and professional life.

UNIT - I: INTRODUCTION:

Study Techniques
Organisation of effective note taking and logical processes of analysis and synthesis
Use of the dictionary
Enlargement of vocabulary
Effective diction

UNIT - II: APPLIED GRAMMAR:

Correct usage
The structure of sentences
The structure of paragraphs
Enlargements of Vocabulary

UNIT - III: WRITTEN COMPOSITION:

Precise writing and summarising
Writing of bibliography
Enlargement of Vocabulary

UNIT - IV: READING AND COMPREHENSION:

Review of selected materials and express oneself in one's words.
Enlargement of Vocabulary.

UNIT - V: THE STUDY OF THE VARIOUS FORMS OF COMPOSITION:

Paragraph, Essay, Letter, Summary, Practice in writing

UNIT - VI: VERBAL COMMUNICATION:

Discussions and summarization, Debates, Oral reports, use in teaching

Scheme of Examination

Written (Theory): Maximum Marks: -80 marks.
No Practical or Viva voce examination

This is a subsidiary subject, examination to be conducted by respective colleges. Marks required for a pass is 35%

REFERENCE

1. English Grammar Collins, Birmingham University, International Language Data Base, Rupa and Co. 1993
2. Wren and Martin - Grammar and Composition, 1989, Chanda & Co, Delhi
3. Letters for all Occasions. A S Myers. Pub - Harper Perennial
4. Spoken English V. Shasikumar and P V Dhanija. Pub. By: Tata McGraw Hill, New Delhi
5. Journalism Made Simple D Wainwright
6. Writers Basic Bookself Series, Writers Digest series
7. Interviewing by Joan Clayton Platkon
8. Penguin Book of Interviews.
9. Communicate to English - Suresh Kumar - Orient Longman Pvt Ltd
10. Spoken English - A Foundation course part I & II Kamalesh Sananda - Orient Longman Pvt Ltd

HEALTH CARE

Teaching Hours : 40

Introduction to Health

Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.
National Health Policy
National Health Programmes (Briefly Objectives and scope)
Population of India and Family welfare programme in India

Introduction to Nursing

What is Nursing ? Nursing principles. Inter-Personnel relationships. Bandaging : Basic turns; Bandaging extremities; Triangular Bandages and their application.

Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.

Lifting And Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.

Bed Side Management: Giving and taking Bed pan, Urinal : Observation of stools, urine. Observation of sputum, Understand use and care of catheters, enema giving.

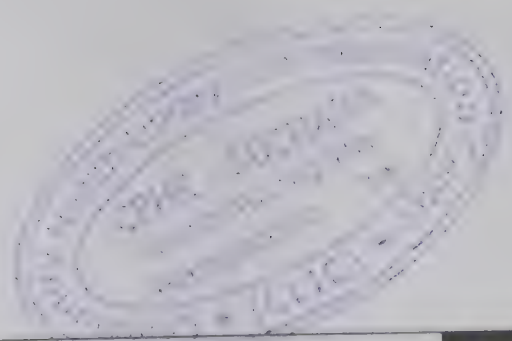
Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion
Care of Rubber Goods
Recording of body temperature, respiration and pulse,
Simple aseptic technique, sterilization and disinfection.
Surgical Dressing: Observation of dressing procedures

First Aid :

Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

Reference Books:

1. Preventive and Social Medicine by J.Park
2. Text Book of P & SM by Park & Park
3. Counseling & Communicate skills for medical and health, Bayne - Orient Longman Pvt Ltd



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BIOCHEMISTRY II

THEORY

1. Blood chemistry (Its constituents)
2. Urine chemistry (Its constituents)
3. Biomolecules:
 - a. Carbohydrate: Metabolism & disorder of carbohydrate
 - b. Lipids: Metabolism & disorders lipids.
4. Vitamins: sources, functions, deficiency, requirements,
5. Enzymes - Introduction, Activation energy, classification, activity, specificity, kinetics v_{max} , K_m , Michaelis Menten equation
6. Biophysics-surface tension, osmolarity and viscosity.
7. Photometry, spectrometry, turbidometry, flame photometry and atomic absorption spectroscopy.
8. MPNB - Urea, Uric Acid, Creatinine of these importance
9. Nutrition
 - a. Calorific value, Respiratory Quotient
 - b. Nitrogen balance, Basal Metabolic Rate
 - c. Dietary fibres
 - d. Nutritional importance of carbohydrates, lipid, proteins and vitamins
 - e. Diseases associated with nutrition
 - f. Prescription of diet
10. Special investigations

Demonstration - Serum electrophoresis
Immunoglobulins
Drug estimation - Digitoxin, Theophyllin, Amphetamines, Sympathomimetics, Cannabinoids, Barbiturates

PRACTICALS

1. Qualitative analysis of carbohydrates, proteins, amino acids.
2. Estimation blood sugar and Blood Urea
3. Quantitative test for urine glucose and GTT.
4. Qualitative screening test for normal and abnormal urine sample.
5. Estimation of non-protein nitrogenous compounds of blood: Blood urea, Creatinine, Creatinine clearance test (CCT)
6. Protein precipitation, dialysis and separation of proteins, electrophoresis of serum, CSF and urine proteins.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Biochemistry II shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

SCHEME OF EXAMINATION- PRACTICALS

The scheme of examination for Biochemistry II Practical shall be as follows: Distribution of marks

Type of Question	Marks allotted
Quantitative estimation	30
Qualitative estimation	30
Urine examination	20
Total	80

MICROBIOLOGY II

Topics: Parasitology, Mycology and Virology

1. Introduction of Mycology. Terms & Classification.

2. Lab Diagnosis of Fungal Infections 2 Hrs.

3. Mycology 14 Hrs.

a. Superficial Mycoses
Malassezia furfur, T.nigra, T.piedra

b. Subcutaneous Mycoses

- i. Mycetoma
- ii. Rhinosporidium
- iii. Sporotrichosis

c. Dermatophytes

d. Systemic Mycoses

- i. Histoplasmosis
- ii. Blastomycosis
- iii. Coccidioidosis
- iv. Paracoccidioidosis

e. Opportunistic Fungi

- 1. Aspergillosis
- 2. Penicillosis
- 3. Zygomycosis
- 4. Pneumocystis
- 5. Mycotoxins

4. Parasitology

1. Protozoology-

Entamoeba histolytica
Balantidium coli
Giardia
Toxoplasma
Malaria
Leishmania

2. Helminthology

Cestodes - Taenia, Echinococcus, D.latum, H.nana

Trematodes - Schistosoma, Fasciola

Nematodes- Ascaris, hookworm, Strongyloides, Trichuris, Trichinella, Dracunculus, Filarial worms

- 5. Virology-** General properties of virus, cultivation of viruses, Pox viruses, Herpesviruses, Adenoviruses, Picornaviruses, Orthomyxovirus, Paramyxoviruses, Arboviruses, Rhabdoviruses, Hepatitis viruses, Oncogenic viruses, HIV, Parvovirus, Viral haemorrhagic fevers, SARS, Rotavirus, Norwalk virus, Astrovirus, Corona virus

PRACTICALS for II year:

Parasitology:

1. Stool examination
 - a. Saline mount
 - b. Iodine mount

Mycology:

1. Slide culture technique
2. KOH mount
3. Identification of fungal cultures
 - a. Colony characteristics and Microscopic examination of Candida, Cryptococcus, Trichophyton, Microsporum, Aspergillus niger, Asp fumigatus, Rhizopus, Fusarium, Penicillium.

Virology

1. Demonstration of embryonated egg inoculation
2. Virology exercise:
 - a. Spot test, ELISA (HBV, HCV, HIV), HI, Paul Bunnell test
 - b. Applied exercise - Rabies, Infantile Diarrhoea, Herpes, HBV, HIV, Influenza.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Microbiology II shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

Scheme of Examination Practical

The scheme of examination for Microbiology II Practical shall be as follows:

Types of Questions	Marks
Spotters	10
Mycology	15
Virology Test	15
Virology Applied Exercise	15
Stool Examination	15
Record	10
Total Marks	80

PATHOLOGY II

Theory:

Histopathology and Hematology

Histopathology

Instrumentation :

- a. Automated Tissue Processor
- b. Microtomes, Knives, Knife sharpners and Ultramicrotome
- c. Freezing microtome and Cryostat
- d. Automatic slide stainer

Techniques :

- a. Routine paraffin section cutting
- b. Frozen section and Cryostat section studies

Staining techniques:

Special stains for Carbohydrates, Connective tissue, Nervous tissue, Bone tissue, Collage fibers, Elastic Fibers, Lipids, Organisms, fungi, parasites, pigments and deposits in tissues

Mounting techniques: Various mounts and mounting techniques

Electron Microscope, Scanning electron microscope, Dark ground and Flourescent microscope

Museum technology

Microphotography and its applications

Maintenance of records and filing of slides

ICDS Classification and coding

Application of computers in Pathology

Hematology

Hemopoiesis, Stem cells, formed elements and their functions

Anticoagulants used in various hematological studies

Routine hematological tests and normal values:

- a. Determination of Hemoglobin and Hematocrit
- b. Enumeration of RBC, WBC & Platelets
- c. Absolute Eosinophil count
- d. Reticulocyte count
- e. Calculation of Red cell Indices
- f. Preparation of staining of blood film for morphology of red cells and differential count

Special Hematological tests:

- a. Sickling tests
- b. Osmotic fragility test
- c. Determination HbF and HbA2
- d. Hemoglobin Electrophoresis
- e. Investigation of G6PD deficiency
- f. Plasma haptoglobin and demonstration of hemosiderin in urine
- g. Tests for Autoimmune hemolytic anemia
- h. Measurement of abnormal Hb pigments

Hemostasis and Coagulation

- a. Normal hemostasis, mechanism of blood coagulation and normal fibrinolytic system
- b. Collection of blood and anticoagulants used in coagulation studies
- c. Investigation of hemostatic mechanism-BT, CT, whole blood coagulation time test, PT, PTT
- d. Assay of clotting factors
- e. Tests for fibrinolytic activity- Euglobulin , clot lysis test and FDP
- f. Platelet function tests

Investigation of Megaloblastic anemia and Iron deficiency anemia

- a. B12 and Folate assay and Schilling test
- b. Estimation of serum iron and iron binding capacity

Bone marrow biopsy study

- a. Needle aspiration and surgical biopsy technique.
- b. Preparation of smears and staining

Demonstration of LE cells

Cytochemistry

Administration in Hematology and Quality control

Practicals:

1. Paraffin section cutting
2. Staining by Hematoxylin & Eosin and other special stains
3. Determination of Hemoglobin and Hematocrit
4. Red blood cell count
5. Total white blood cell count
6. Platelet count
7. Differential count of white blood cells
8. Absolute Eosinophil count
9. Reticulocyte count
10. Calculation of red cell indices
11. Determination of ESR
12. Determination of BT, CT, Whole blood clotting time
13. Determination of PT and PTT
14. Blood smear preparation and staining

15. Osmotic fragility test
16. Sickling test
17. LE cell preparation

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Pathology II shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

Scheme of Examination Practical

Distribution of marks

Type of Question	Marks allotted
Hematoxylin and eosin or a special stain	10
Hemoglobin or PCV	10
Total count	10
Differential count	10
ESR	10
PS preparation and staining	10
Record	10
spotters	10
Total	80

SUBSIDIARY SUBJECTS

SOCIOLOGY

Teaching Hours: 20

Course Description

This course will introduce student to the basic sociology concepts, principles and social process, social institutions [in relation to the individual, family and community and the various social factors affecting the family in rural and urban communities in India will be studied.

Introduction:

Meaning - Definition and scope of sociology

Its relation to Anthropology, Psychology, Social Psychology

Methods of Sociological investigations - Case study, social survey, questionnaire, interview and opinion poll methods.

Importance of its study with special reference to health care professionals

Social Factors in Health and Disease:

Meaning of social factors

Role of social factors in health and disease

Socialization:

Meaning and nature of socialization

Primary, Secondary and Anticipatory socialization

Agencies of socialization

Social Groups:

1. Concepts of social groups, influence of formal and informal groups on health and sickness. The role of primary groups and secondary groups in the hospital and rehabilitation setup.

Family:

The family, meaning and definitions

Functions of types of family

Changing family patterns

Influence of family on individual's health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy

Community:

Rural community: Meaning and features - Health hazards to rural communities, health hazards to tribal community.

Culture and Health:

Concept of Health
Concept of culture
Culture and Health
Culture and Health Disorders

Social Change:

Meaning of social changes
Factors of social changes
Human adaptation and social change
Social change and stress
Social change and deviance
Social change and health programme
The role of social planning in the improvement of health and rehabilitation

Social Problems of disabled:

Consequences of the following social problems in relation to sickness and disability remedies to prevent these problems
Population explosion
Poverty and unemployment
Beggary
Juvenile delinquency
Prostitution
Alcoholism
Problems of women in employment

Social Security:

Social Security and social legislation in relation to the disabled

Social Work:

Meaning of Social Work
The role of a Medical Social Worker

Reference Books:

1. Sachdeva & Vidyabhushan, Introduction to the study of sociology
2. Indrani T.K., Text book of sociology for graduates nurses and Physiotherapy students, JP Brothers, New Delhi 10

INDIAN CONSTITUTION

Prescribed for the First Year students of all degree classes

Unit-I: Meaning of the term 'Constitution'. Making of the Indian Constitution 1946-1950.

Unit-II: The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III: Fundamental Rights and Duties their content and significance.

Unit - IV: Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit - V: Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI: Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit - VII: The Election Commission and State Public Service commissions.

Unit - VIII: Method of amending the Constitution.

Unit - IX: Enforcing rights through Writs:

Unit - X: Constitution and Sustainable Development in India.

Books:

1. J.C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.
2. J.N . Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution - Corner Stone of a Nation-Oxford, New Delhi, 2000.

ENVIRONMENT SCIENCE AND HEALTH

Introduction to Environment and Health

Sources, health hazards and control of environmental pollution

Water

The concept of safe and wholesome water.

The requirements of sanitary sources of water.

Understanding the methods of purification of water on small scale and large scale.

Various biological standards, including WHO guidelines for third world countries.

Concept and methods for assessing quality of water.

Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal.

Awareness of standards of housing and the effect of poor housing on health.

Role of arthropods in the causation of diseases, mode of transmission of arthropods borne diseases, methods of control

Recommended Books.

1. Text Book of Environmental Studies for under graduate courses By Erach Bharucha Reprinted in 2006, Orient Longman Private Limited /Universities Press India Pvt. Ltd.
2. English Kannada Encyclopedia Dictionary - Orient Longman Pvt Ltd.

BIOCHEMISTRY III

THEORY

1. Liver Function tests. Role of the Liver in metabolism, formation of bilirubin and mode of excretion.
2. Gastric Analysis: Composition of gastric juice, concepts of free and bound acids, gastric acid secretions stimulations.
3. Renal function, Renal function test and renal clearance test.
4. Calculi: Theory of formation and analysis, Renal clearance concentration and application of Phenolsulfonaphthalein.
5. Acid - Base balance and its disturbances.
6. Inorganic ions: Calcium metabolism, phosphate metabolism, sodium-potassium balance and trace element (Fe, CU).
7. Metabolism of proteins and amino acids.
8. Over view & replication, translation, transcription and genetic engineering.
9. Metabolic disorders:
 - a. Amino acids
 - b. Proteins
 - c. Inborn errors of metabolic disorders.
2. Clinical enzymology.
3. Radio isotope techniques: Principle, definition of units, measurement of radiation standards, crystal counting. Resources and applications.
4. Immunoassay: Different methods, principle and applications.
5. Biostatistics: Population mean, Correlation Coefficient, Standard deviation, Standard error.

PRACTICALS:

1. Specimen Collections: Urine, Blood, Gastric juice,
2. Accuracy, precision and quality control - Demonstration and preparation of two methods using histogram, F-test and Barr test.
3. Enzymes: amylase (salivary and Pancreatic), Alkaline Phosphatase, Acid Phosphatase, SGOT, SGPT, LDH and CPK- demonstration on auto analyzer.
4. Liver function tests: estimation of Bilirubin - total and conjugates, Urobilinogen,
5. Gastric analysis: Determination of free and total acid, gastric stimulation.
6. Lipid determination of serum lipids - cholesterol, triglycerides and lipoprotein fractionation.
7. Inorganic ions - Determination of calcium in serum and urine, serum phosphates, chloride sodium and potassium.
8. Analysis of calculi
9. Urine - screening for inborn errors of metabolism
10. RFT
11. Cardiac markers
(Relevant charts on the above topics for interpretation and diagnosis)

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Biochemistry III shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

Scheme of Examination Practical

Distribution of marks

Type of Question	Marks allotted
Quantitative estimation	30
Renal calculi	30
Urine examination	20
Total	80

MICROBIOLOGY III

Systemic Bacteriology Immunology, Applied

IMMUNOLOGY

1. Infection 2hrs

2. Immunity 4 Hrs.

- A. Innate immunity
- B. Acquired immunity (adaptive immunity)
- C. Active and passive immunity
 - 1. Natural acquired active immunity
 - 2. Artificial acquired active immunity
 - 3. Natural acquired passive immunity- breast feeding
 - 4. Artificial acquired passive immunity

3. Immune System

- A.
 - 1. Cell development
 - 2. B lymphocytes (general knowledge of their role)
 - a. Bursa of Fabricius
 - b. Stem cell differentiation
 - c. Gut-associated lymphoid tissue (GALT)
 - 3. T lymphocytes
 - a. Stem cell differentiation (general knowledge of their role)
 - b. Cytotoxic T (TC) cells
 - c. Delayed-type hypersensitivity T (TD) cells
 - d. Helper T (TH) cells
 - e. Suppressor T (TS) cells
 - 4. Natural killer cells
- B. Dual nature of the immune system
 - i. Humoral immunity
 - ii. Cell-mediated immunity
- C. General properties of immune responses
 - 1. Recognition of self versus nonself
 - a. Clonal selection theory B-cells
 - b. Tolerance
 - c. Clonal deletion
 - 2. Specificity
 - a. Definition
 - b. Cross-reactions
 - 3. Heterogeneity
 - 4. Memory
 - a. Memory cells
 - b. Anamnestic response

4. Humoral Immunity

General characteristics

1. Antigen types

1. Antigen sensitization
2. Plasma cells

5. Antigen & Antibody 04 Hrs.

1. Antigens
2. Epitopes (antigenic determinants)
3. Hapten
5. Antibodies consequences of antibody binding
6. Titer

6. Immune Response

A. Properties of Antibodies (immunoglobulins)*

1. Light chains *
2. Heavy chains *
3. Constant and variable regions *
4. Antigen binding sites*
Fab and Fc regions *

B. Classes of immunoglobulins*

1. IgG*
2. IgM*
3. IgA*
 - a. J chain
 - b. Secretory piece
4. IgE*
5. IgD*
5. Antibody titer

C. Primary and secondary responses *

D. Kinds of antigen-antibody responses *

E. How humoral responses eliminate foreign antigens *

1. Basic mechanisms*
 - a. Agglutination*
 - b. Opsonization*
 - c. Activation of complement* Do not worry about the detailed mechanism of complement. Know that it makes a membrane attack complex and what that is.
 - d. Neutralization
2. Summary of humoral immunity

7. Monoclonal Antibodies

A. Production

1. Hybridoma formation *
2. Cloning of cells

B. Uses*

1. Research tools*
2. Diagnostic uses*

1. Therapy*

8. Cell-Mediated Immunity *

A. General characteristics*

B. The cell-mediated immune reactions

1. Antigen processing
2. Helper T (TH) cells
 - a. TH1 (inflammatory T) cells
 - b. TH2 cells
3. Suppressor T (TS) cells
5. Cytotoxic (killer) T (TC) cells
6. Natural killer (NK) cells
7. Memory T cells
8. Lymphokine release

C. Superantigens

9. Factors That Modify Immune Responses

A. Compromised host

B. Modifying factors

1. Age
2. Stress
3. Diet
4. Exercise
5. Injuries
6. Environmental factors

10. Hypersensitivity reactions

11. Autoimmune disorders

12. Transplantation immunology

13. Antimicrobial Sensitivity.

Disk diffusion and Dilution 3 Hrs.

14. Bacteriology of Water, Milk and Air 5 Hrs.

15. Systematic Bacteriology 75 Hrs.

Classification, Morphology, Genotypic & Phenotypic characteristics, Pathogenesis, Disease caused, Lab Diagnosis & Prophylaxis

A. Gram Positive Bacteria

- i. Staphylococcus
- ii. Streptococcus
- iii. Pneumococcus
- iv. Corynebacteria
- v. Clostridia
- vi. Bacillus
- vii. Listeria
- viii. Actinomyces
- ix. Nocardia

B. Gram Negative Bacteria

- i. Neisseria
- ii. Enterobacteriaceae
- iii. Escherichia
- iv. Klebsiella
- v. Enterobacter
- vi. Proteus
- vii. Salmonella
- viii. Shigella
- ix. Yersinia
- x. Pseudomonas
- xi. Haemophilus
- xii. Brucella
- xiii. Pasturella
- xiv. Legionella
- xv. Bordetella
- xvi. Burkholderia
- xvii. Gardnerella
- xviii. Vibrio
- xix. Campylobacter
- xx. Helicobacter
- xxi. Bacteroides
- xxii. Fusobacterium

C. Spirocheates

- i. Treponema
- ii. Borrelia
- iii. Leptospira

D. Mycobacteria

- i. M. tuberculosis
- ii. M. leprae
- iii. Atypical Mycobacteria

- E. Mycoplasma
- F. Chlamydiae
- G. Rickettsiaceae
- H. Applied microbiology- Diseases.
- I. Molecular techniques in diagnostic microbiology- PCR, DNA hybridisation

Desirable to know: (There will be no main questions or short notes from this portion. One paper may have only one question under short answers i.e. 3 marks)

Erysipelothrix

1. Propionibacteria
2. Rhodococcus
3. Tropheryma
4. Moraxella
5. Serratia
6. Stenotrophomonas
7. Acinetobacter
8. Streptobacillus
9. Parvobacteria

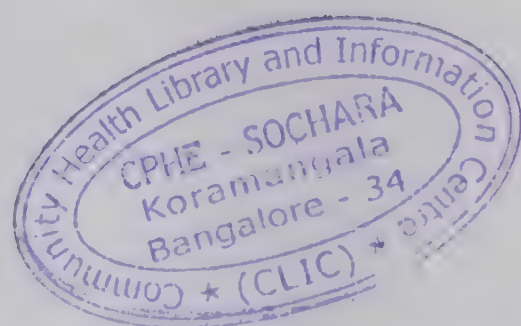
PRACTICALS FOR 3rd YEAR

BACTERIOLOGY

1. Staining-
 - a. Grams staining
 - b. ZN staining
 - c. Alberts staining
2. Hanging drop preparation
3. Culture methods
4. Introduction to biochemical reactions
5. Identification of bacterial culture
 - a. Colony characteristics
 - b. Morphological characteristics
 - c. Motility study
 - d. Interpretation of biochemical reactions
6. Antibiotic sensitivity testing- Kirby Bauer method

1. Applied bacteriology- exercise

7. Immunology: Serological tests:
 - a. Specimen collection
 - b. Principle
 - c. Methods.
 - d. Procedure
 - e. Normal values/ Significant titer
 - f. Interpretations
 - g. Limitations : of all the following tests
 - i. Widal
 - ii. ASO
 - iii. CRP
 - iv. RPR/VDRL/TRUST
 - v. RA
 - vi. HBsAg /anti HIV detection
 - vii. ELISA



Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Microbiology III shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

Scheme of Examination Practical

The schem of examination for Microbiology III Practical shall be as follows:

Types of Questions		Marks
Grams Staining		10
ZN Staining		10
Bacteriology Identification	Organism one	10
	Organism two	10
Serology	Test one	10
	Test two	10
Spotters		10
Record		10
Total Marks		80

PATHOLOGY III

Cytology, Automation in cytology, Cytogenetics, Cytochemistry Immunohematology and Blood transfusion

Cytology

1. Normal cell structure, functions, cytologic criteria of malignancy
2. Types of specimens, methods of collection & preparation of cell block
3. Different fixatives and methods of fixation
4. Staining : (a) Papanicolaou's stain- principle , preparation and staining techniques
 - a. May Grunwald Giemsa stain
 - b. Shorr's stain
 - c. Aceto orcin stain

Female Genital tract

1. Anatomy, Histology, Physiology & normal cytology
2. Techniques of collection of specimen for cervical cytology study
3. Hormonal cytology and cytological indices
4. Cervical cytology screening for malignant and nonmalignant conditions, Radiation changes & follow up
5. Cytology of Endometrium - normal , nonmalignant and in malignant conditions
6. Cytology in Ovarian cancers

Respiratory tract, Gastrointestinal tract and Urinary tract

1. Anatomy, Histology and Physiology
2. Collection of sample, preparation of smears and staining
3. Cytology of normal, nonmalignant & malignant conditions

C S F and Effusions

1. Cytology of CSF in inflammatory, nonmalignant & malignant Conditions
2. Cytology of effusions in nonmalignant and malignant conditions

Glands - Breast, Thyroid, Salivary glands and Lymph nodes

1. Anatomy , Histology and Physiology
2. Fine needle aspiration cytology of glands and other soft tissue mass
3. Cytologic features in nonmalignant and malignant conditions of different glands and nipple discharges

Automation in Cytology

1. Flow cytometry
2. Image Analysis
3. Principles, Equipments, procedures & Evaluation

Tissue culture and Immunohistochemistry

1. Equipments for Tissue culture studies
 - a. Laminar air flow equipment
 - b. Carbon dioxide incubator
 - c. Inverted microscope
2. Derivation of culture from tissue
 - a. Enzymatic digestion of tissue using collagenase, protease
 - b. Plating in tissue culture media
 - c. Observation of cells in Invertoscope
 - d. Subculturing & derivation of cell lines
3. Characterization of cell lines
 - a. Determination of biochemical markers in cells
 - b. Chromosomal & DNA content of cells
 - c. Immunological properties of cells
4. Preservation of Immortalized cell lines
 - a. Storage in Glycerol in Liquid Nitrogen
 - b. Storage in Dimethyl sulfoxide in Liquid Nitrogen

Cytogenetics

1. Introduction to cytogenetics, terminology, classification & nomenclature of human chromosomes
2. Methods of karyotypic analysis
 - a. Culture of bone marrow cells, peripheral blood lymphocytes, solid tumors & skin fibroblastsDirect preparation from tumor materials
3. Characterization of human chromosomes by various banding techniques
4. Sex chromatin identification
5. Chromosomes in neoplasia and oncogenes

Immunocytochemistry

1. Basics concepts, monoclonal antibodies & preparation
2. Fluorescence reactions

Immunohematology and Blood transfusion

1. ABO Blood group and Rh system
2. Subgroups of A and B , Other blood groups and Bombay group

3. HLA antigens and their significance
4. Principles of Blood transfusion:
 - a. Blood donor selection
 - b. Methods of bleeding donors
 - c. Blood containers, anticoagulants and storage of blood
 - d. Coomb's test and its significance
 - e. Screening of blood for infective material
 - f. Blood components, preparation & component therapy
 - g. Autologous transfusion
 - h. Transfusion reactions and work up
 - i. Blood bank organization, standards, procedures, techniques and quality control

Practicals

Preparation of various cytology smears and fixation

1. Papanicolaou's and May Grunwald Geimsa staining
2. Hormonal cytology study
3. Blood grouping and Rh typing
4. Cross matching techniques
5. Screening of Donor's blood for infective agents
6. Transfusion reaction work up
7. Preparation of blood components

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Pathology III shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6 x 5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10 x 3	30
GRAND TOTAL			80

Scheme of Examination Practical

The scheme of examination for Pathology III Practical shall be as follows: Distribution of marks

Type of Question	Marks allotted
Pap stain	20
Blood grouping and typing	10
Cross matching	15
Coomb's test	15
Record	10
Spotters	10
Total	80

BIO STATISTICS

Time Allotted: 20 Hours

Course Description:

Introduction to basic statistical concepts: methods of statistical analysis; and interpretation of data

Behavioral Objectives:

Understands statistical terms.

Possesses knowledge and skill in the use of basic statistical and research methodology.

Unit - I : Introduction

Meaning, definition, characteristics of statistics.

Importance of the study of statistics.

Branches of statistics.

Statistics and health science including nursing.

Parameters and estimates.

Descriptive and inferential statistics.

Variables and their types.

Measurement scales

Unit - II: Tabulation of Data

Raw data, the array, frequency distribution.

Basic principles of graphical representation.

Types of diagrams - histograms, frequency polygons, smooth frequency polygon, commulative frequency curve, ogive.

Normal probability curve.

Unit - III : Measure of Central Tendency

Need for measures of central tendency

Definition and calculation of mean - ungrouped and grouped

Meaning, interpretation and calculation of median ungrouped and grouped.

Meaning and calculation of mode.

Comparison of the mean, and mode.

Guidelines for the use of various measures of central tendency.

Unit - IV : Measure of Variability

Need for measure of dispersion.

The range, the average deviation.

The variance and standard deviation.

Calculation of variance and standard deviation ungrouped and grouped.

Properties and uses of variance and SO

Unit -V : **Probability and Standard Distributions.**
Meaning of probability of standard distribution.
The Binominal distribution.
The normal distribution.
Divergence from normality – skewness, kurtosis.

Unit - VI : **Sampling Techniques**
Need for sampling – Criteria for good samples.
Application of sampling in Community.
Procedures of sampling and sampling designs errors.
Sampling variation and tests of significance.

Unit - VII : **Health Indicator**
Importance of health Indicator.
Indicators of population, morbidity, mortality, health services.
Calculation of rates and rations of health.

Recommended Books.

B.K. Mahajan & M. Gupta (1995) Text Book of Preventive & Social Medicine, 2002, 17th Edition Jaypee Brothers.

BASICS IN COMPUTER APPLICATIONS

The course enables the students to understand the fundamentals of computer and its applications.

Introduction to Data processing :

Features of computers, Advantages of using computers. Getting data into / out of computers. Role of computers. What is Data processing? Application areas of computers involved in Data processing. Common activities in processing. Types of Data processing, Characteristics of information. What are Hardware and Software?

Hardware Concepts :

Architecture of computers, Classification of computers, Concept of damage. Types of storage devices. Characteristics of disks, tapes, Terminals, Printers, Network. Applications of networking concept of PC System care, Floppy care, Data care.

Concept of Software.

Classification of software : System software. Application of software. Operating system. Computer system. Computer virus. Precautions against viruses. Dealing with viruses. Computers in medical electronics Basic Anatomy of Computers

Principles of programming

Computer application - principles in scientific research ; work processing, medicine, libraries, museum , education, information system.

Data processing

Computers in physical therapy - principles in EMG, Exercise testing equipment, Laser.

Scheme of Examination for MEDICAL ELECTRONICS including COMPUTER APPLICATIONS

One Written (Theory) paper: Maximum Marks: -80 marks.

No Practical or Viva voce examination

SECTION *III*

CLINICAL TRAINING

Content and purpose

The clinical component has been designed to complement the academic program and runs throughout the course. The placement have to be designed so that the students will be able to observe the practical application of the academic course wherever possible. Content can be tailored to meet either National or Local needs as is deemed to be most appropriate.

1st year : Introduction to the Hospital Setting

The purpose of this phase is :

- i. For the students to become familiar with some of the practical applications of the academic course
- ii. To introduce the wider hospital setting
- iii. To help the students to identify the various disciplines within a hospital, their role and the importance of cooperation.
- iv. To introduce patients in a clinical setting and begin to acquire basic communication skills.

2nd year : Skills Necessary to work in a Hospital

To be completed very early in the training. The following procedures will be demonstrated to the students who will be expected to observe or participate as appropriate.

General procedures to be observed when patients attend for appointment :

- Lifting and moving techniques.
- Administration of bedpans, vomit bowls, etc.,
- Care and management of drugs in the hospital setting.

Correct procedures when dealing with patients with infectious diseases

- University precautions.

Correct procedures when dealing with immuno-compromised patients :

- Hygiene practices
- Simple dressings
- Sterile procedures
- Oxygen administration

Care of patients with :

- Breathing difficulties
- Terminal illness
- Mental impairment
- Physical disability
- Special care of the geriatric and pediatric patient
- Stoma care
- Handling of patients with bone metastases
- Care of the patient following an anaesthetic
- Care of lines in the incubated patient
- Communication skills with patients and relatives
- Terminally ill and Hospice

2nd & 3rd year : Skills Related to working in a department

Introduction to the department. Time will be spent on each unit within the department. The purpose of this phase is to :

In the department :

- i. Familiarize the students with the different units within the department and the procedures carried out on each unit.
- ii. Enable the student to recognize and relate to the basic terminology introduced in the academic program.
- iii. Help to establish a sense of identity within the student group and to understand the role of the Technology in the management of various cases.
- iv. Introduce the students to the staff of the department.
- v. Help the student to understand team roles.
- vi. Familiarize the students with written QA programs within the department.

Equipment's and Integration :

- i. Begin to become competent in the manipulation of the equipment.
- ii. Be able to communicate effectively with patients.
- iii. Begin to integrate into the department as part in specific and multidisciplinary teams.
- iv. Begin to empathize with patients and to appreciate their own feelings in the clinical situation.
- v. Being able to handle and achieve proficiency in mould room techniques.

Safety & Precautions in Practice :

- i. Identifying the functions of various equipment and safe handling.

- ii. Identifying the functions on a control panel, indicating their purpose and safely using these when appropriate.
- iii. Safely using the accessory equipment in the correct context.
- iv. Correctly and safely using equipment related to patient immobilization.
- v. Demonstrating the correct procedure for various techniques

To Achieve Clinical Competence

The purpose of this phase is for the students to :

- i. Demonstrate competence in the manipulation of equipment.
- ii. Demonstrate an ability to anticipate the physical and psychological needs of the patient and respond to them.
- iii. Demonstrate the ability to communicate with ease with other staff involved in the multidisciplinary treatment of the patient.
- iv. Increasingly participate as a team member in all aspects of the patient's management.
- v. Demonstrate competence in simulator procedures.
- vi. Acquire basic computer skills.
- vii. Participate in the development / revision of formal written quality assurance procedures / programme.
- viii. Set up a patient on their first visit.

To achieve final competency substantial time will be spent :

- i. Setting up multi field techniques under supervision.
- ii. Participating in the quality control procedures in the department in accordance with the protocols.
- iii. Simulating and localizing a target volume.
- iv. Discussing the role of local rules and outline those in place in the different departments.

Graded Responsibility (structured training schedule)

I year : Theory classes, observation in treatment planning and treatment execution.

II year : Theory classes, participation in OPD, mould room techniques, treatment planning, treatment execution under the supervision of consultant, senior technologist, project work.

III year : Theory classes, participation in OPD, Treatment planning and execution under supervision of consultant & Senior Technologist. Submission of Project Work, Mould Room Techniques, Quality Assurance.

Rotation posting

Students may be posted to other relevant departments or other centers with better and latest equipment's for a minimum period of 1 to 2 months, for completion of training in recent advance in the specialty. The student on completion of the training shall submit a report duly signed by the concerned department to the HOD.

Monitoring Learning Progress

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only also helps teachers to evaluate students but also students to evaluate themselves. The monitoring be done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using sample checklist provided (Assessment forms).

The learning out comes to be assessed should included :

- i. Personal Attitudes
- ii. Acquisition of knowledge
- iii. Clinical and operative skills
- iv. Teaching skills

Candidate should be encouraged to participate in teaching activities, seminars and literature reviews.

1. Periodic tests :

The departments may conduct periodic tests (Internal Assessment), the tests may include written papers, practical with viva voce.

Work diary / Log, Personal Attitudes.

The essential items are :

- Caring attitudes
- Initiative
- Organizational ability
- Potential to cope with stressful situations and undertake responsibility
- Trust worthiness and reliability
- To understand and communicate intelligibly with patients and other
- To behave in manner which establishes professional relationships with patients and colleagues
- Ability to work in team
- A critical enquiring approach to the acquisition of knowledge the methods used mainly consist of observation. It is appreciated that these items require a degree subjective assessment by the guide, supervisors and peers.

3. Acquisition of Knowledge :

The methods used comprise of 'Log Book' which records participation in various teaching / learning activities by the students. The number of activities attended and the number in which presentations are made are to be recorded. The log book should periodically be validated by the supervisors, some of the activities are listed.

The list is not complete. Institutions may include additional activities, if so, desired.

4. Technical skills

Day to day work : Skills on the machines should be assessed periodically. The assessment should include the candidates' sincerity and punctuality, analytical ability and communication skills.

Clinical and procedural skills : The candidate should be given graded responsibility to enable learning by apprenticeship. The performance is assessed by the guide by direct observation. Particulars are recorded by the student in the log book.

5. Teaching Skills :

Book :

Every candidate shall maintain a work diary and record his / her participation in the training programs conducted by the department such as practical, literature reviews, seminars, etc. Special mention may be made of the presentations, by the candidate as well as details of practical or laboratory procedures, if any conducted by the candidate.

6. Records :

Records, log books, project report and marks obtained in tests will be maintained by the Head of the Department and will be made available to the University as indicated. The record books maintained by the student should be submitted to the Head of the Department 6 months prior to completion of the course and the head of the department makes a certification of the of the academic progress an assessment of student performance through out the said course shall be made by the HOD.

The log book is a record of the important activities of the candidates during his training internal assessment should be based on the evaluation of the log book collectively, log books are a tool for the evaluation of the training programme of the institution by external agencies. The record includes academic activities as well as the presentations and procedures carried out by the candidate.

The first part of the paper discusses the importance of the research and the objectives of the study. It also provides a brief overview of the literature on the topic.

2. Methodology

This section describes the research methodology, including the data sources, the sample, and the statistical methods used in the analysis.

3. Results

The results of the study are presented in this section. It includes the findings of the descriptive statistics, the results of the regression analysis, and the conclusions drawn from the data.

4. Discussion

The discussion section provides a detailed analysis of the results, comparing them with the existing literature and discussing the implications of the findings.

5. Conclusion

The conclusion summarizes the main findings of the study and provides recommendations for future research.

6. References

The references section lists the sources of the information used in the study.

Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore

Vision Statement

The Rajiv Gandhi University of Health Sciences, Karnataka, aims at bringing about a confluence of both Eastern and Western Health Sciences to enable the humankind "Live the full span of our lives allotted by God in Perfect Health"

It would strive for achievement of academic excellence by Educating and Training

Health Professionals who

- Shall recognize health needs of community,
- Carry out professional obligations Ethically and Equitably and in keeping with National Health Policy, It would promote development of scientific temper and Health Sciences Research.

It would encourage inculcation of Social Accountability amongst students, teachers and Institutions.

It would Support Quality Assurance for all its educational programmes.

Motto

Right for Rightful Health Sciences Education



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